



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: SHOWA CORPORATION)
Serial Number: 10/636,080)
Filed: 08/07/03)
For: BOTTOM VALVE APPARATUS OF HYDRAULIC)
SHOCK ABSORBER)
Docket Number: 13547)

Declaration of Takeshi Murata

December 3, 2004

I, Takeshi Murata, declare as follows:

1. There is a problem that occurs during the assembly of bottom valve apparatus of hydraulic shock absorbers. Namely, the leading edge of the coil spring gets caught in the check valve. A bottom valve apparatus with a caught check valve is either improperly assembled and can not be used and/or must be disassembled and reassembled.
2. This problem has created assembly problems for years. It has gone unresolved for years, as no suitable solution has been found.
3. I carried out a study on 2002.10.3/. My study identified the cause of the problem. The problem is caused by using a nut with a right hand thread and coil spring also having a right hand winding direction. When the nut is rotated in the fastening direction, the coil spring rotates the same direction due to the contacting friction between the nut and the coil spring. If the coil spring slips off the outer shape of the check valve- even temporarily - the spring is wound into and caught by the check valve.

4. After I identified the cause of the problem I was able to develop the inventive solution.
5. In the inventive bottom valve apparatus, there is a bolt and a coil spring, as shown in Fig. 4B. The thread direction of the bolt is set opposite to the winding direction of the coil spring.
6. When a nut is fastened, the force to make the nut rotate to the right direction effects the coil spring due to the contacting friction between the seating surface of the nut and the upper end of the coil spring.
7. In this case, because the lower end 56A of the coil spring moves to the left, the end portion of the coil spring goes back and does not catch or wrap into a lower side of a check valve even if the coil spring comes off the outer shape of the check valve during assembly. The catching or wrapping up of the check valve is spontaneously prevented during assembly because the end portion of the coil spring moves in the direction to get out of the check valve.
8. On the other hand, in the prior art, the thread direction of the bolt is the same as the winding direction of the coil spring. When a prior art nut is fastened, the end portion 4A of the coil spring rotates in the same direction as the coil spring going forward. As a result, if the coil spring comes off form the outer shape of the check valve, even temporarily, the coming off is made worse because the coil spring becomes caught.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under 18 USC 1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

07. 11. 18

Date

Takeshi Murata

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